Title	<Solid State Chemistry> Solid State Chemistry
Author(s)	
Citation	ICR annual report (2003), 9: 18-19
Issue Date	2003-03
URL	http://hdl.handle.net/2433/65363
Right	
Type	Article
Textversion	publisher

Solid State Chemistry
- Solid State Chemistry -

http://msk2.kuicr.kyoto-u.ac.jp

Prof
TAKANO, Mikio
(D Sc)

Assoc Prof
TERASHIMA, Takahito
(D Sc)

Instr
AZUMA, Masaki
(D Sc)

PD (JSPS)
ICHIKAWA, Noriya
(D Eng)

PD (JSPS)
SAITO, Takashi
(D Sc)

PD (PRESTO)
NIITAKA, Seiji
(D Sc)

PD (JSPS)
YU, Ranbo
(D Eng)

PD (COE)
BELIK, Alexei
(D Sc)

Students

ISHIWATA, Shintaro (D3)
NINJBADGAR, Tsedev (D2)
KAN, Daisuke (M2)
YAMADA, Ikuya (M2)
TANAKA, Kazunori (RS)
MASUNO, Atsunobu (D2)
KANDA, Hironori (D1)
KOBINO, Masashi (M2)
SHINOKUBO, Masaharu (M1)
CHU, Shucheng (RS)

Visitor

Prof RAO, C. N. R. Jawaharlal Nehru Centre for Advanced Scientific Research, India, 11 March 2002

Scope of Research

Novel inorganic materials that have new, useful or exotic features such as superconductivity, ferromagnetism and quantum spin ground state are synthesized by novel methods. Recent topics are:

- High-T_c superconducting copper oxides with higher T_c or J_c.
- Perovskite-based compounds with unusual magnetic and electronic properties.
- Low-dimensional spin system showing dramatic quantum effects.

Research Activities (Year 2002)

Presentations

Single Crystal Growth of Perovskites and Related Comounds at Several GPa, Azuma M, Saito T, Ishiwata S, Yamada I, Takano M, MRS 2002 Spring Meeting, 1-5 April.

Formation of Two Novel Zirconium Phosphates Controlled by Organic Solvents, Yu R, Wang D, Kumada N, Kinomura N, Matsumura Y, Takano M, Fifth International Conference on Solvothermal Reactions (ICSTR), 22 - 26 July.

Hydrothermal Formation of Novel Cerium Materials with Open-Framework Architectures, Yu R, Wang D, Takei T, Kumada N, Kinomura N, Takano M, International Symposium on solid State Chemistry in China, 9 - 12 August.

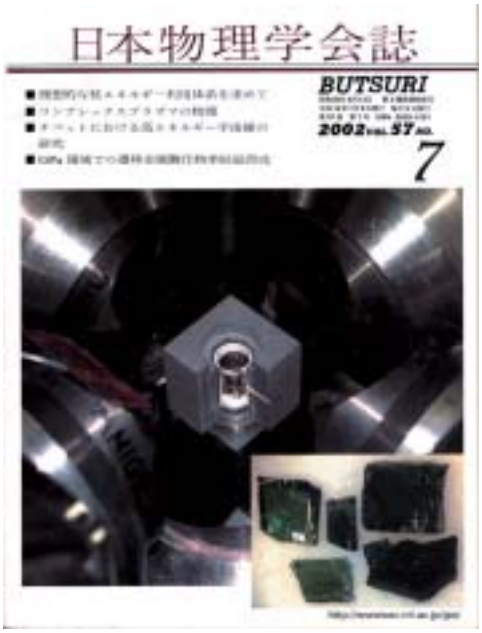
Single Crystal Growth of $Ca_{2-x}Na_xCuO_2Cl$ and Related Compounds at High Pressure of Several GPa, Azuma M, Saito T, Ishiwata S, Yamada I, Takano M, Kohsaka Y, Takagi H, 2002 International Conference on Physics and Chemistry of Molecular and Oxide Superconductors, 13 - 18 August.

Iron Oxides Revisited: Solid State Chemistry, Takano M, The 2nd Hiroshima Workshop-Transport and Thermal Properties of Advanced Materials, 16 - 19 August.

Topics

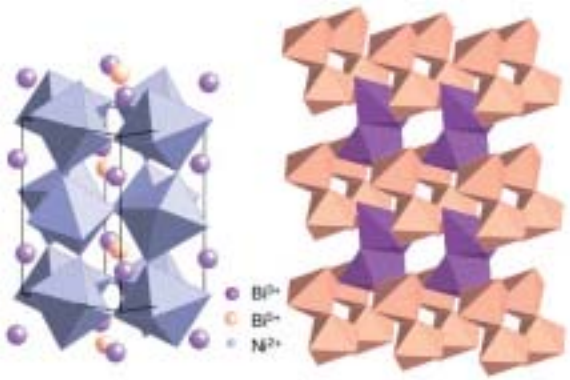
Single crystal growth of transition metal oxides at high pressures of several GPa

High pressure synthesis is a powerful technique to search for new materials. Generally speaking, however, it used to be almost impossible to obtain single crystal samples of these high-pressure phases. We have developed a technique to grow single crystals of transition metal oxides by means of flux methods based on the synchrotron X-ray powder diffraction studies at high pressures of several GPa. Magnetic, electrical and optical measurements on the grown crystals are being performed.



Crystal structure and physical properties of new Ni(II) perovskite $BiNiO_3$

New triclinic perovskite $BiNiO_3$ has been synthesized at a high pressure of 6 GPa with high oxidizing atmosphere. Structure refinement based on synchrotron X-ray powder diffraction and bond valence calculation revealed the disproportionation of Bi ions into Bi^{3+} and Bi^{5+}. Both of these were coordinated in distorted BiO_6 octahedra reflecting the strong covalency of Bi-O bonds. Because of the presence of the highly oxidied Bi^{5+}, the oxidation state of Ni was 2+ and $BiNiO_3$ thus showed insulating behavior with localized S=1 magnetic moments.



Single Crystal Growth of Transition Metal Oxides at High Pressures of Several GPa, Azuma M, Saito S, Niitaka S, Ishiwata S, Kanda H, Yamada I, Kohsaka Y, Takagi H, Takano M, 15th International Symposium on Superconductivity (ISS2002), 11 - 13 November.

Grants

Takano M, Development of 3d transition-metal oxides with oxygen p holes. Grant-in-Aid for Scientific Research (A) (2), 1 April 2002 - 31 March 2005.

Terashima T, Electric field induced superconductivity in the FET devices using ultrathin $SrTiO_3$ single-crystal substrate with high dielectric constant. Grant-in-Aid for Scientific Research (B) (2), 1 April 2002 - 31 March 2004.

Terashima T, Preparation and properties of epitaxial thin films of oxides containing transition-metal ions in unusually high-valence states, Priority Area Grants from the Ministry of Education, Science, Culture and Sport of Japan, 1 April 2000 - 31 March 2004.

Azuma M, Physical properties of oxychloride superconductor crystals grown at high pressures. Grant-in-Aid for Scientific Research (B) (2), 1 April 2001 - 31 March 2003.

Azuma M, Exploration of photo-functions in strongly correlated electron systems of transition metal oxides, PRESTO, 1 December 2001 - 31 November 2004.

Awards

Azuma M, JSPM Award for Innovatory Research.

Search for new transition metal oxides and single crystal growth by means of high pressure synthesis.

The Japan Society of Powder and Powder Metallurgy.